sampling apparatus automatically cease operation when all available sample storage is filled. To this end, the full storage sensor **16** indicated in FIGS. **1** and **3** may be included in the system, connected by the line **14** to the "wait" phase air supply line **106,** so that air pressure is provided to the sensor **16** at the completion of each sampling cycle. The full storage sensor may take a variety of forms, such as a weighing device when a single storage container is employed, or a device for sensing a full cycle of movement of a distributing apparatus, in the case of multiple sample storage containers. In any event, the sensor **16** may be operable to admit pressurized air from the line **14** to the pilot line **15** upon sensing of the full condition. The line **15** leads to a pilot **111***e* of the cylinder advance valve **111,** but this pilot is set to inhibit cycle operation when pressurized, rather than initiating it.

As long as pilot pressure remains in the inhibit pilot **111***e,* none of the other pilots of the valve **111** can cause the advancing cylinder **113** to activate, even if pilot pressure reaches them. The inhibit pilot **111***e* may, for example, shut off air from the line **108** into the valve **111** as long as it is pressurized. It may, therefore, comprise a common type pilot-operated valve, with the valve operated by the pilots **111***a* through **111***d* located downstream. Thus, neither the manual start valve **109** nor the external initiator **4** can start a cycle as long as all sample storage facilities are full. However, once the full condition is manually corrected and reset, with the inhibit pilot line **15** vented, a sampling cycle may be started in the usual manner. The venting of the line **15** may be accomplished by the provision of manual venting apparatus at the full storage sensor **16** (not shown), or automatic venting apparatus associated with the sensor, operable to momentarily vent the line **15** whenever the sensor is actuated, then released (not shown). The release would occur whenever the full condition is removed. Such venting apparatus can employ well-known type valving equipment.

If it is desired to fill a series of containers in continuous cycling, pneumatic apparatus (not shown) may be provided between the line **106** and the external initiator **4,** or directly between the line **106** and the cylinder advance valve **111,** to start a new cycle whenever a cycle is completed. In the latter case the linking apparatus may take the form of an additional pilot on the valve **111,** connected into the line **106.** Container advance may still occur when called for, and cycling is inhibited whenever full storage is sensed. A valve (not shown) may be provided in the added pilot line or in the external initiator **4** so that either continuous cycling or normal one-cycle operation may be manually selected. The occurrence of single cycles is, of course, controlled by the manual start valve **109** or the external initiator **4,** as discussed above.

The above described preferred embodiment provides flow sampling apparatus which is explosion proof because of its entirely pneumatic operation, which is fully automatic in its cycling operations, and which may be produced in portable form and placed directly in a sewer line or other facility in which samples are to be taken. Some variations to the described embodiment may be made, such as the use of sequential logic instead of the illustrated camshaft arrangement, which is preferred because it is more easily understood and operated by less skilled personnel. Similarly, certain phases of operation of the sampling cycle may be eliminated, the most essential phases being the fill phase and the drain phase. These and other changes to this preferred embodiment will be apparent to those skilled in the art and may be made without departing from the spirit and scope of the following claims.

I claim:

1. An explosion-proof flow sampling apparatus for taking samples from liquids which may contain solids, comprising:

a sealed chamber;

an intake conduit connecting the chamber with the flow to be sampled;

a source of vacuum connected to the chamber;

a drain conduit at the bottom of the chamber for draining a sample into a storage container below, said drain conduit including a shutoff valve;

a tube leading downward from the top of the chamber to a level approximately representing a full chamber, said source of vacuum communicating with the chamber through the tube;

means for sensing a predetermined pressure difference between the interior of the tube and the remainder of the chamber above the level of the liquid; and

pneumatically-operated controller means operably connected to said sources of pressure and vacuum, to said drain conduit shutoff valve, and to said sensing means, including means for activating the source of vacuum to exert suction on the chamber while holding closed the shutoff valve to draw sample material into the chamber through the intake conduit until the sensing means senses said predetermined pressure difference; means for terminating the vacuum after the sensing of said pressure difference; and means for subsequently opening the shutoff valve to drain the sample through the drain conduit to the storage container.

2. The apparatus of claim **1** which further includes a source of pressurized gas connected to the chamber, and wherein the controller means inludes means for supplying pressurized gas from the gas source to the chamber for a predetermined period while holding closed the drain conduit shutoff valve, prior to activating the source of vacuum, to thereby purge the intake conduit of fluid from the flow before drawing a sample.

3. The apparatus of claim **2** wherein the controller means further includes means for supplying pressurized gas from the gas source to the chamber for a predetermined period while holding closed the drain conduit shutoff valve, subsequent to the draining of the sample, to purge the intake conduit of remaining fluid.

4. The apparatus of claim **1** wherein the intake conduit includes a chamber end portion with an open end of adjustable height in the chamber, below the level of said tube, and wherein the controller means includes means for relieving vacuum in the chamber for a predetermined period following the termination of vacuum, with the drain conduit shutoff valve closed, so that sample material siphons back out of the chamber through the intake conduit until the level of the open end is reached.

5. The apparatus of claim **1** wherein the intake conduit includes a chamber end portion with an open end of adjustable height in the chamber, below the level of said tube, and wherein the controller means includes means for supplying pressurized gas from the gas source to the chamber for a predetermined period following the termination of vacuum, with the drain conduit shutoff valve closed, so that sample material flows back out of